

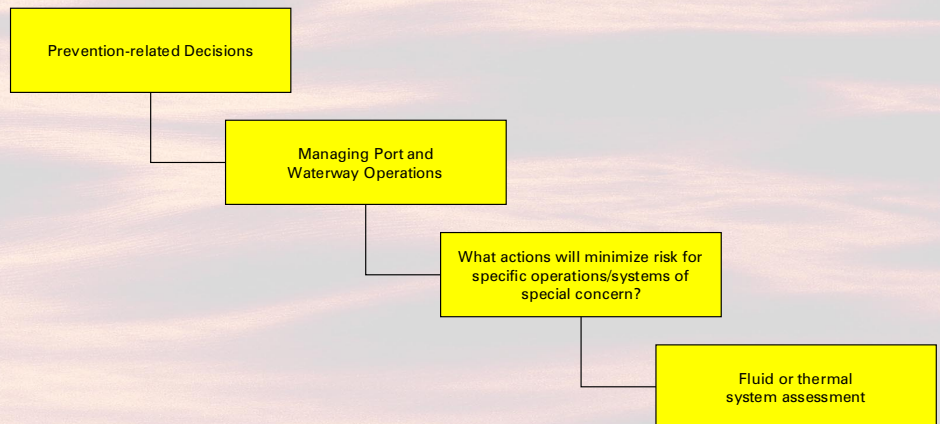


Risk Assessment of Fuel Barge Filling at Small Marine Terminals

Risk of Spills

The large numbers of small marine facilities, their sometimes less-than-ideal locations, and their varying levels of equipment sophistication, maintenance, and adherence to procedures allow many opportunities for spills. The risk of spills could be lessened by: identifying deviations in transfer operations that may lead to spills, safeguards that are already in place to prevent spills, and new or improved risk controls that can address spills. A risk assessment tool was needed to accomplish this.

RBDM Decision Structure Hierarchy



HAZOP (Hazard and Operability) Analysis

Because of its structured, systematic analysis approach, HAZOP analysis was used as the basis for the risk assessment tool. HAZOP analysis is essentially a “what-if” analysis with a very structured way of developing the “right” what-if questions. The HAZOP analysis technique consists of four steps:

1. Define the activity or situation of interest
2. Define the consequences of interest for the analysis
3. Subdivide the activity or system and define deviations
4. Ask the “what-if” questions

RBDM Guidelines

The use of this tool was consistent with the guidance in Volume 3, Chapter 10 of the *RBDM Guidelines*.

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Example: A Section of a HAZOP Worksheet

HAZOP Analysis of Barge Filling Operations at a Typical Small Fueling Terminal				
1.0 Line from a Storage Tank to the Barge Manifold (Including the Transfer Hose)				
Deviation	Causes	Consequences	Safeguards	Recommendations
1.2 Low/no flow rate	Pump operator, dockman, or tankerman closes a valve at the wrong time Valve fails closed	Potential to cause high pressure in the line if the discharge of the pump is blocked while operating	Tankerman and dockman monitoring to detect problem	Rec. 3 — Consider installing flow rate indicators in the filling lines Rec. 4 — Consider formalizing the use of visual cues to help tankermen easily identify valve positions (e.g., opened/closed) as they move around the deck

Will It Help?

Using HAZOP analysis helped to identify some potentially beneficial risk-reduction options for fuel barge filling operations at small marine terminals that may not have been captured otherwise. More importantly, the process provided a structured approach for assessing the risks and ensuring that rational risk management strategies are in place. Getting industry partners involved in the analysis as active stakeholders should make the results even more useful.

